



ELECTRICIAN

Electrician 2

A program with a sequence of courses that prepares individuals to apply technical knowledge and skills to assemble, install, operate, maintain, and repair electrically energized systems, such as residential, commercial, industrial electric-power systems wiring, D.C. and A.C. motors, controls, and electrical distribution panels. Includes instruction in the use of advanced technology test equipment.

USOE
7/21/2008

ELECTRICIAN 1

Levels: Grades 10-12
Units of Credit: Minimum 0.5
CIP Codes: 46.0304
Prerequisite: None

CORE STANDARDS, OBJECTIVES, AND INDICATORS

STANDARD **Students will be able to understand electrical safety.**
460304-01

OBJECTIVES

460304-0101 Demonstrate safe working procedures in a construction environment.
460304-0102 Explain the purpose of OSHA and how it promotes safety on the job.
460304-0103 Identify electrical hazards and how to avoid or minimize them in the workplace.
460304-0104 Explain safety issues concerning lockout/tagout procedures, personal protection using assured grounding and isolation programs, confirm space entry and fall protection systems.

STANDARD **Students will be able to understand hand bending.**
460304-02

OBJECTIVES

460304-0201 Identify the methods of hand bending conduit.
460304-0202 Identify the various methods used to install conduit.
460304-0203 Use math formulas to determine conduit bends.
460304-0204 Mark 90° bends, back-to-back bends, offsets, kicks, and saddle bends using a hand bender.

STANDARD **Students will be able to understand fasteners and anchors.**
460304-03

OBJECTIVES

460304-0301 Identify and explain the use of anchors
460304-0302 Demonstrate the correct applications for fasteners and anchors

**STANDARD
460304-04**

Students will be able to understand electrical theory I.

OBJECTIVES

- 460304-0401 Recognize what atoms are and how they are constructed.
460304-0402 Define voltage and identify the ways in which it can be produced.
460304-0403 Explain the difference between conductors and insulators.
460304-0404 Define the units of measurement that are used to measure the properties of electricity.
460304-0405 Explain how voltage, current, and resistance are related to each other.
460304-0406 Using the formula for Ohm's Law, calculate an unknown value.
460304-0407 Explain the different types of meters used to measure voltage, current, and resistance.
460304-0408 Using the power formula, calculate the amount of power used by a circuit.

**STANDARD
460304-05**

Students will be able to understand electrical theory II.

OBJECTIVES

- 460304-0501 Explain the basic characteristics of a series circuit.
460304-0502 Explain the basic characteristics of a parallel circuit.
460304-0503 Explain the basic characteristics of a series-parallel circuit.
460304-0504 Calculate, using Kirchoff's Current Law, the total current in parallel and series-parallel circuits.
460304-0505 Find the total amount of resistance in a series circuit.
460304-0506 Find the total amount of resistance in a parallel circuit.
460304-0507 Find the total amount of resistance in a series-parallel circuit.

**STANDARD
460304-06**

Students will be able to understand electrical test equipment.

OBJECTIVES

- 460304-0601 Explain the operation of and describe the following pieces of test equipment:
 - Ammeter
 - Ohmmeter
 - Continuity tester
 - Voltmeter
 - Volt-ohm-milliammeter (VOM)
 - Voltage tester
- 460304-0602 Explain how to read and convert from one scale to another using the above test equipment
- 460304-0603 Explain the importance of proper meter polarity
- 460304-0604 Explain the difference between digital and analog meters.

STANDARD **Students will be able to understand Introduction to the National Electrical Code.**
460304-07

OBJECTIVES

460304-0701 Explain the purpose and history of the National Electrical Code (NEC).
460304-0702 Describe the layout of the NEC.
460304-0703 Explain how to navigate the NEC.
460304-0704 Describe the purpose of the National Electrical Manufacturers' Association (NEMA) and the National Fire Protection Association (NFPA).
460304-0705 Explain the role of testing laboratories.

STANDARD **Students will be able to understand raceways, boxes and fittings.**
460304-08

OBJECTIVES

460304-0801 Describe various types of cable trays and raceways.
460304-0802 Identify and select various types of sizes and raceways.
460304-0803 Identify and select various types of raceway fittings.
460304-0804 Identify various methods used to install raceways.
460304-0805 Demonstrate knowledge of NEC raceway requirements.
460304-0806 Describe procedures for installing raceways and boxes on masonry surfaces.
460304-0807 Describe procedures for installing raceways and boxes on concrete surfaces.
460304-0808 Describe procedures for installing raceways and boxes in a wood frame environment.
460304-0809 Describe procedures for installing raceways and boxes on drywall surfaces.
460304-0810 Recognize safety precautions that must be followed when working with boxes and raceways.

STANDARD **Students will be able to understand conductors.**
460304-09

OBJECTIVES

460304-0901 Explain the various sizes and gauges of wire in accordance with American Wire Gauge standards.
460304-0902 Identify insulation and jacket types according to conditions and applications.
460304-0903 Describe voltage ratings of conductors and cables.
460304-0904 Read and identify markings on conductors and cables.
460304-0905 Use the tables in the NEC to determine the ampacity of a conductor.
460304-0906 State the purpose of stranded wire.
460304-0907 Describe the different materials from which conductors are made.
460304-0908 Describe the different types of conductor insulation.

460304-0909	Describe the color coding of insulation.
460304-0910	Describe the equipment required for pulling wire through conduit.
460304-0911	Describe the procedure for pulling wire through conduit.
460304-0912	Install conductors in conduit.
460304-0913	Pull conductors in a conduit system.

STANDARD **Students will be able to understand boxes and fittings.**
460304-10

OBJECTIVES

460304-1001	Describe the different types of nonmetallic and metallic boxes.
460304-1002	Understand the NEC requirements for box fill.
460304-1003	Calculate the required box size for any number and size of conductors.
460304-1004	Explain the NEC regulations for volume required per conductor in outlet boxes.
460304-1005	Properly locate, install, and support boxes of all types.
460304-1006	Understand the NEC requirements for boxes supporting lighting fixtures.
460304-1007	Install the different types of fittings used in conjunction with boxes.
460304-1008	Explain how boxes and fittings are selected and installed.
460304-1009	Describe the various types of box supports.

PROFESSIONAL DEVELOPMENT

STANDARD **Students will understand the need for professional**
460201-11 **development.**

OBJECTIVES

460201-1101	Complete a personal inventory
460201-1102	Set and meet goals
460201-1103	Motivate yourself
460201-1104	Decision making
460201-1105	Manage time
460201-1106	Organize personal belongings and lab equipment
460201-1107	Communicate verbally
460201-1108	Write effective communications
460201-1109	Establish a personal reading program
460201-1110	Develop effective work skills and attitudes
460201-1111*	Master a working knowledge of SkillsUSA <ul style="list-style-type: none"> ▪ state the SkillsUSA motto ▪ state the SkillsUSA creed ▪ learn the SkillsUSA colors ▪ describe the official SkillsUSA dress ▪ describe the procedure for becoming a SkillsUSA officer

STANDARD **Students will understand the need for leadership skills.**

460201-12

OBJECTIVES

- 460201-1201 Serve on a committee
- 460201-1202 Prepare an agenda
- 460201-1203 Assist in planning a meeting
- 460201-1204 Review basic parliamentary procedure
 - Make a main motion
- 460201-1205 Participate in a school project
- 460201-1206 Attend a community meeting
- 460201-1207 Practice effective speaking
- 460201-1208 Present a 3-5 minute talk
- 460201-1209 Implement a leadership project
- 460201-1210* Master a working knowledge of SkillsUSA
 - Describe the meaning of the SkillsUSA emblem
 - State the SkillsUSA pledge
 - Describe the duties of a SkillsUSA officer

STANDARD 460201-13

Students will understand the need for career planning.

OBJECTIVES

- 460201-1301 Define your future occupation
- 460201-1302 Survey employment opportunities
- 460201-1303 Report on a trade journal article
- 460201-1304 Explore opportunities for advanced training
- 460201-1305 Conduct a worker interview
- 460201-1306 Contact a professional association
- 460201-1307 Explore entrepreneurship opportunities
- 460201-1308 Give a talk about your career
- 460201-1309 Review career goals

STANDARD 460201-14

Students will understand the need for employment skills.

OBJECTIVES

- 460201-1401 Develop a list of work standards to follow at school and on the job.
- 460201-1402 Evaluate your personal ethics
 - Evaluate your personal ethics against acceptable workplace ethics
- 460201-1403 Build a job search network
- 460201-1404 Find job leads
- 460201-1405 Write a resume

- 460201-1406 Create a job portfolio
- 460201-1407 Complete a job application
- 460201-1408 Write a business letter and memo
- 460201-1409 Participate in an actual or simulated job interview

*SkillsUSA PDP requirements - recommended